DOCUMENT RESUME

ED 125 904 SE 020 949

AUTHOR	Armer, Paul; Gullard, Pamela
TITLE	Program on Science, Technology and Society (POSTS), Third General Report, September 1, 1974, through August 31, 1975.
INSTITUTION	Center for Advanced Study in the Behavioral Sciences, Stanford, Calif.
SPONS AGENCY	National Science Foundation, Washington, D.C. RANN Program.
PUB DATE	1 Apr 76
NOTE	45p.; For the First and Second General Report, see SE 020 790-791
AVAILABLE FROM	Center for Advanced Study in the Behavioral Sciences, Stanford, California 94305 (free)
EDRS PRICE	MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS	*Behavioral Science Research; *Behavioral Sciences; *Humanistic Education; *Natural Sciences; Research; Science Education; *Sciences; Scientific Enterprise; Technology
IDENTIFIERS	*National Science Foundation; *Research Applied to National Needs (RANN)

ABSTRACT

The work reported here was largely supported by the Research Applied to National Needs (RANN) program of the National Science Foundation. This third general report includes a list of the advisory council for the program, the Board of Trustees, and the officers of the Center for the period of time through August 31, 1975. A description is given of the Center for Advanced Study in the Behavioral Sciences. The intent of the Center is to improve the quality of scholarship of those in fields that illuminate the question of how men and societies behave. The Program on Science, Technology and Society (POSTS) is described as directed toward understanding a technology-dependent civilization, and aims to illuminate the interrelation of technology and culture by means of more effective communication between specialists in the natural, and the behavioral and policy sciences. Fellows associated with POSTS are listed as well as brief descriptions of POSTS projects. A list of publications is included. (EB)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

ED125904

Third General Report

POSTS

PROGRAM ON SCIENCE, TECHNOLOGY & SOCIETY

Center for Advanced Study
in the
Behavioral Sciences

September 1, 1974 through August 31, 1975

SE 020 949

TABLE OF CONTENTS

Section		
I.	Advisory Council for the Center's Program on Science, Technology and Society (POSTS)	2
II.	Board of Trustees of the Center	2
III.	Officers of the Center	2
IV.	The Center for Advanced Study in the Behavioral Sciences	3
V.	The Program on Science, Technology and Society	3
VI.	Fellows Associated with POSTS	5
VII.	POSTS Projects	7
VIII.	Publications	38
IX.	Presentations	40

The work reported here was largely supported by the RANN (Research Applied to National Needs) Program of the National Science Foundation (Grant #ARA71-01834-A02). This work is also supported by the Center's own funds and by numerous other grants made to the Center or to the individual scholars involved.

Prepared by Paul Armer
and Pamela Gullard
4/1/76

202 Junipero Serra Boulevard, Stanford, California 94305
Telephone (415) 321-2052

I. ADVISORY COUNCIL FOR THE CENTER'S POSTS PROGRAM*

O. MEREDITH WILSON, *Chairman*
Director, Center for Advanced Study in the Behavioral Sciences
KENNETH J. ARROW
Department of Economics, Harvard University
LEWIS M. BRANSCOMB
I.B.M. Corporation
SIDNEY D. DRELL
Stanford Linear Accelerator Center
DAVID A. HAMBURG
Department of Psychiatry, Stanford University School of Medicine
CARYL P. HASKINS
President Emeritus, Carnegie Institution of Washington
JOSHUA LEDERBERG
Department of Genetics, Stanford University School of Medicine
ROBERT K. MERTON
Department of Sociology, Columbia University

II. BOARD OF TRUSTEES OF THE CENTER FOR ADVANCED STUDY IN THE BEHAVIORAL SCIENCES*

WILLIAM G. BOWEN, *Chairman*
President, Princeton University
JAMES S. COLEMAN
Department of Sociology, University of Chicago
ROBERT A. DAHL
Department of Political Science, Yale University
WILLIAM T. GOLDEN
Corporate Director and Trustee
CARYL P. HASKINS
President Emeritus, Carnegie Institution of Washington
ROGER W. HEYNS
President, American Council on Education
EDWIN E. HUDDLESON, JR.
Partner, Cooley, Godward, Castro, Huddleson and Tatum
GARDNER LINDZEY
Vice President and Dean of Graduate Studies, University of Texas
ROBERT R. SEARS
Department of Psychology, Stanford University
LOGAN WILSON
President Emeritus, American Council on Education
O. MEREDITH WILSON
Director, Center for Advanced Study in the Behavioral Sciences

III. OFFICERS OF THE CENTER*

O. MEREDITH WILSON
Executive Director
PRESTON S. CUTLER
Associate Director
JANE KIELSMEIER
Assistant to the Director
ALAN HENDERSON
Business Manager

---

*The persons listed here held office through August 31, 1975; since then, some changes have been made. Gardner Lindzey became the Director of the Center on September 1, 1975.

IV. CENTER FOR ADVANCED STUDY IN THE BEHAVIORAL SCIENCES

The Center is a non-profit organization established by the Ford Foundation in 1954. It conducts a fellowship program for distinguished scholars who are in fields that illuminate the question of how men and societies behave, or in disciplines which are enough allied to the behavioral sciences that the presence of the scholar adds to the environment for all the Fellows. Each year about fifty scholars participate, working for the academic year at the Center's facility located near Stanford University.

The intent of the Center is to improve the quality of scholarship. To accomplish this, it provides the participating scholar with the time and facilities to intensely pursue and develop his** intellectual interests without interruption, to reevaluate himself in relation to his field, and to closely interact with peers from various fields. Fellows are freed for the year from the teaching and administrative chores they carry at their home institutions. The Center focuses on maintaining an environment that allows for reflective study yet promotes conversation and other interaction among the scholars. In this atmosphere, scholars not only can increase their knowledge, but also can bring to their work different perspectives gained from the other Fellows. Many Fellows have found that this freshening experience continues to influence their work, and consequently that of their colleagues, years after the fellowship has ended.

Because the Center's major interest is in the scholar, not in a particular subject or field, selection of a Fellow is based on individual past performance and promise. Demonstrated or potential leadership abilities are more important that the nature of a scholar's special interests. Nevertheless, each Fellow is chosen for his possible contribution to the interaction of the year's group.

Though founded by the Ford Foundation and the recipient of an endowment fund and operating grants from the Ford Foundation, the Center depends on numerous sources of funds to meet its operational expenditures. Grants are made directly to the Center and some scholars arrive with outside grants or partial support through sabbatical leave arrangements with their home institutions.

V. PROGRAM ON SCIENCE, TECHNOLOGY AND SOCIETY (POSTS)

The Program on Science, Technology and Society (POSTS), directed toward understanding a technology-dependent civilization, aims to illuminate the interrelation of technology and culture by means of more effective communication between specialists in the natural, and the behavioral and policy sciences. The focus of the program is not so much to produce problem-solving books and articles as to improve the quality of scholars concerned with the

**Although masculine forms are used to refer to Fellows, they are intended, of course, to refer to both men and women.

problems of today's society, and to increase the awareness of these problems in scholars not now directly involved.

Problems at the interface between science, technology and society are almost always multidisciplinary. Yet our educational institutions, with very few exceptions, produce only specialists. So, to be effective in dealing with problems in the science, technology and society area, scholars often have to devote considerable effort toward educating themselves in disciplines other than their original specialty. Some Fellows have utilized their year at the Center to move into these multidisciplinary problem areas. Thus, the purpose of POSTS is in concert with the intent of the entire Center. The reflective nature of the rest of life at the Center is characteristic as well of the POSTS program. Fellows are free to move in and out of the program as their intellectual pursuits dictate.

The products of the POSTS program include research and writing on the ramifications of today's technology (described in Section VII). But more importantly, by promoting discussions at the Center on the socio-scientific problems of our time, the program alters the perceptions and even the research interests not only of scholars directly involved in the program but also of their associates at the Center. The most important follow-on result of the POSTS program is its continuing influence on the scholar's viewpoint and, subsequently, on that of his colleagues at his home institution and in his profession. POSTS scholars frequently speak about their work before audiences ranging from their fellow professionals to the public at large, thus increasing the general knowledge and awareness of the problems of a technology-dependent society.

An Advisory Council (members listed earlier) provides definition and review of the program and nominates and helps recruit appropriate Fellows. Paul Armer became Coordinator of POSTS in March, 1972, dividing his time between that function and that of being a Fellow. The Board of Trustees of the Center has maintained a close interest in the program and has final authority in approving fellowships for specific individuals.

Although the awarding of the grant by N.S.F. to the Center was the specific action that brought POSTS into being, financial support for the program is diverse. Since the grant does not provide for an indirect cost allowance, Center funds (either from endowment income or other grants) are required for all Fellows participating in the program. In 1974-75 the Henry J. Kaiser Family Foundation sponsored three Fellows (Jacob Fine, William Parson, and Osler Peterson) who participated in the POSTS program. Further, some participating Fellows have been partially supported by their home institutions and/or grants from various agencies and foundations.

Many Fellows work on several subjects while at the Center. For some of the Fellows listed in Section VI as having been associated with POSTS, only a fraction of their activities was POSTS-related. In such cases, their support from the Center was charged to POSTS on a corresponding basis.

VI. FELLOWS ASSOCIATED WITH POSTS*

1971/1972

Charles O. Jones
University of Pittsburgh, Maurice Falk Professor of Politics

Joshua Lederberg
Stanford University School of Medicine, Professor of Genetics and Scientist in Residence at the Center for Advanced Study in the Behavioral Sciences, POSTS program

Gardner Lindzey
University of Texas, Vice President and Dean of Graduate Studies

James C. Loehlin
University of Texas, Professor of Psychology

Edwin Mansfield
Wharton School, University of Pennsylvania, Professor of Economics

James N. Spuhler
University of New Mexico, Leslie Spier Professor of Anthropology

1972/1973

Paul Armer
Center for Advanced Study in the Behavioral Sciences, Coordinator of the POSTS Program and Fellow

William F. Baxter
Stanford University, Professor of Law

John S. Chipman
University of Minnesota, Professor of Economics

Victor R. Fuchs
City University of New York, Professor of Economics and National Bureau of Economic Research, Inc., Vice President — Research

Donald Kennedy
Stanford University, Professor of Biology

Joshua Lederberg
Stanford University School of Medicine, Professor of Genetics and Scientist in Residence at the Center for Advanced Study in the Behavioral Sciences, POSTS program

John R. Platt
Mental Health Research Institute, Associate Director, and University of Michigan Professor of Physics

Frederick C. Redlich
Yale University, Professor of Psychiatry

Terrance Sandalow
University of Michigan, Professor of Law

Israel Scheffler
Harvard University, Professor of Philosophy

Vernon L. Smith
University of Massachusetts, Amherst, Professor of Economics

Lefton S. Stavrianos
Northwestern University, Professor of History

*The affiliations of some POSTS Fellows may have changed since their stay at the Center.

Joseph Weizenbaum
Massachusetts Institute of Technology, Professor of Computer Science

1973/1974

Graham Allison
Harvard University, Kennedy School of Government, Professor of Politics

Paul Armer
Center for Advanced Study in the Behavioral Sciences, Coordinator of the POSTS program and Fellow

John P. Crecine
University of Michigan, Institute of Public Policy Studies, Professor of Political Science

Michel Crozier
Centre de Sociologie de Organizations, Paris, France, Director of Research

Yehuda Elkana
Van Leer Jerusalem Foundation, Jerusalem, Israel, Director; and Hebrew University, Professor of History and Philosophy of Science

Martin Krieger
University of Minnesota, School of Public Affairs

Joshua Lederberg
Stanford University School of Medicine, Professor of Genetics and Scientist in Residence at the Center for Advanced Study in the Behavioral Sciences, POSTS program

James March
Stanford University, School of Education, David Jacks Professor of Education

Robert K. Merton
Columbia University, University Professor

Eugen Pusić
Zagreb University, Zagreb, Yugoslavia, Professor of Administrative Science

Daniel Shimshoni
Tel Aviv University, Tel Aviv, Israel, Professor of Public Administration

Judith Tendler
Center for Latin American Studies, University of California, Berkeley

Arnold Thackray
University of Pennsylvania, Professor of the History of the Sociology of Science

Harriet Zuckerman
Columbia University, Professor of Sociology

1974/1975

Paul Armer
Center for Advanced Study in the Behavioral Sciences, Coordinator of the POSTS program and Fellow

Garry Brewer
The Rand Corporation, Social Science Department, Senior Staff
Otto Davis
Carnegie-Mellon University, Professor of Political Economy
Michael Dempster
University of Oxford, Balliol College, Fellow, Tutor and University Lecturer in Industrial Mathematics
Jacob Fine
Harvard University, Boston City Hospital, Surgeon
Eliot Freidson
New York University, Professor of Sociology
Robert Haggerty
University of Rochester, School of Medicine, Professor and Chairman, Pediatrics
Gudmund Hernes
University of Bergen, Professor of Sociology
Dale Jorgenson
Harvard University, Professor of Economics
Joshua Lederberg
Stanford University School of Medicine, Professor of Genetics and Scientist in Residence at the Center for Advanced Study in the Behavioral Sciences, POSTS program
David Mechanic
University of Wisconsin, Professor of Sociology
Uwe Nerlich
Foundation for Science and Politics, Munich, Germany, Director of Research
William Parson
Rockefeller Foundation, Internal Medicine, Senior Staff
Osler Peterson
Harvard University, School of Medicine, Professor of Preventive Medicine
George Quester
Cornell University, Professor of Government
Richard Smoke
Wright Institute, Fellow
Lawrence Weiler
Stanford Arms Control and Disarmament Agency, Coordinator
Aaron Wildavsky
University of California, Berkeley, Dean and Professor at the Graduate School of Public Policy
Joe Wray
Rockefeller Foundation, Senior Staff

VII. POSTS PROJECTS

The following is a review of the written materials and other products that have resulted from POSTS. Most of the material produced during the first three years of the program was described in earlier reports. However, because the length of time between origi-

nation of an idea and completion of a paper varies considerably depending on the scholar and the subject, some of the early POSTS work is just now appearing. Synopses of this work appear in the first three sections below.

Some of the early POSTS work was completed by the scholar in time to be described in the first two reports, but was not published soon enough to be included in the "Publications" section. Those books and articles listed in Section VIII of this report but not described herein are marked with asterisks. The first two General Reports, containing descriptions of these works, are available upon request.

1971/1972

Edwin Mansfield

For several years Mansfield has been intensively researching all aspects of the innovation process in industry. His most recent papers have dealt with probabilities of success in industrial research and development (R&D), the cost of product innovations, and the costs and benefits of international technology transfer.

The first paper (19) describes the results of quantitative studies conducted to test a number of hypotheses concerning the effects of organizational and strategic factors associated with probabilities of success in a firm's R&D program. The probabilities of three types of success were studied: of technical completion, of commercialization (given technical completion) and of economic success (given commercialization). The data show that there is great variability among the firms in these probabilities—from as high as almost 1.00 to as low as .05—even among firms in the same industry. Factors contributing to this variability include: (1) If firms want to increase their probabilities of commercialization, the findings suggest the desirability of early investigation of the profit potential of R&D programs. (2) There is a trade-off between the probability of technical completion and the probability of economic success. Technically ambitious and fundamental projects are less likely to be technically completed, but if completed, they tend to have a higher rate of economic success than projects which are less fundamental and ambitious. (3) Formal quantitative project selection techniques, as currently applied, seem to increase the probability of commercialization, but reduce the probability of economic success .

In another article (20), Mansfield and John Rapoport began looking at the costs of the innovation process within the firm, a subject about which little is known. One conceptual problem has been that economists sometimes have assumed that R&D costs could be treated as synonymous with the cost of product innovation. In previous studies, Mansfield and a team of other researchers have shown that this assumption is a poor one since R&D expenditures account for an average of about half the total innovation costs. However, there is an enormous amount of variation among new products in the percent of costs that go for R&D. Mansfield and Rapoport made a detailed study of 17 chemical innovations introduced by 5 firms in order to

learn more about the causes for this large variation. Since the sample is small and only in one industry, the study conclusions are tentative. Nevertheless, the data show that about 50% of the variation can be explained by five factors. The amount of total innovation costs devoted to R&D tends to vary directly with the importance of the innovation as measured by expected sales volume and with the size of the innovating firm, and the percent of R&D costs tends to vary inversely with the amount of experience the innovator has had in the relevant technological area and with the total innovation costs. Also, R&D costs are a smaller part of the total innovation costs when a new pilot plant is built for the new product.

If confirmed by future research these results could have several interesting ramifications. For example, if experience in a technological area helps reduce R&D costs, this fact could have implications "for competitive relationships among firms, and for barriers to entry, as well as for intrafirm decision-making."

In another article (18), Mansfield emphasizes that the transfer of technology is by no means costless. When a plant is built abroad based on U.S. technology, there generally are outlays for engineering consultation prior to building the plant, costs of transferring engineering information concerning the process and/or product and of supervising the detailed engineering, R&D costs involved in adapting the technology, and costs due to low labor productivity and poor product quality during the period when the workers are learning to utilize the new technology. Research indicates that these costs of transferring technology are a substantial portion of the expense of establishing a new plant abroad. Mansfield points out a number of factors that influence the cost of technology transfer, and provides empirical results on this score. Also, he discusses U.S.-U.S.S.R. international technology transfer from the point of view of his work as U.S. Chairman of the U.S.-U.S.S.R. Working Group on the Economics of Scientific and Technological Information.

1972/1973

Lefton Stavrianos

In his latest book (33), Stavrianos states that western civilization is at the beginning of a trend which will lead to a "dark age" similar to that which occurred after the decline of the Roman Empire. The time will be one of despair, pessimism and insecurity. He predicts that it will also be marked by decentralization—political, social and economic. For example, he believes that just as Rome's imperial structure gave way to feudal fragmentation so also today's nation-states "show signs of ungluing." Another characteristic of the coming age is that westerners will increasingly turn to systems of ethics that until recently they have largely ignored. Many will follow mystery religions and many others will turn to Maoist theory for ethical guidance.

Stavrianos foretells that ". . . a half-millenium of western hegemony will surely end." He also predicts that there will be increasing equality

among all people. He says, "Liberation theology demands that the present exploitation of four-fifths of the human family by the remaining one-fifth be ended by rapid social change." This change may come violently or nonviolently, depending on the strength of the resistance by those in power. In any case, Stavrianos believes that this change and other transformations in the coming dark age will constitute a "new beginning' for civilization. He believes that the future epoch holds promise for mankind as well as peril.

1973/1974

Graham Allison

In a recent article (2), Allison and Frederic Morris state that arms control agreements have "only constrained and channeled national weapons development processes"; they have not slowed them. The prevailing view of how strategic weapons systems are developed focuses on international "bargaining," e.g. the U.S. increased its MIRV warheads to counter the expected extension of the Moscow ABM system countrywide. The authors argue, however, that this "action-reaction" explanation for the arms race is an oversimplification; it does not provide sufficient reason for one weapon to emerge rather than another. The authors suggest that at least two other causal factors are at work: internal political processes and organizational structures. It is important for arms control analysts to remember that weapons systems are deployed after a long (10-15 years) process of development; that this development is determined by hundreds of important, relatively independent decisions that no one political official or body can possibly oversee; and that bargaining between domestic organizations based on their parochial interests has more influence on weapons' development than does international bargaining. Thus, actions by the Soviet Union serve primarily as justification for the American participants in the bureaucratic struggle to advance weapons that they favor.

Michel Crozier

In the first chapter of his recent book (10), Crozier states that the vague and persistent feeling that democracies have become ungovernable has been growing steadily in Western Europe. The capacity of European governments to act and to meet the challenge of citizens' demands ". . . has been drastically impaired. . . . This impairment of capacities is becoming prevalent . . . in bargaining among groups, income redistribution, and the handling of inflation." The background of the problem of governability includes ". . . an explosion of human interaction and correlatively a tremendous increase of social pressure." European societies are now characterized by ". . . concentration, interdependence, and a complex texture." Unfortunately, the European governments have responded to social complexity by increasing centralization and forms of social control that modern citizens have learned to reject.

1974/1975

In 1974/1975 one group of scholars worked closely together on a project concerning the federal government and the economy. This collaborative material is described first, followed by descriptions of work by the individual member scholars, and then work by other individual FOSTS Fellows, listed in alphabetical order. It should be noted that work which has not yet been published will be covered in next year's report.

Otto Davis, Michael Dempster, Aaron Wildavsky—*"The U.S. Federal Budget Process."*

In the early 1960's Davis, Dempster and Wildavsky began work on determining exactly how the annual U.S. Federal Budget is developed. They found that a basic model for the process could be characterized as: this year's request for money from an agency is a markup of last year's appropriation and this year's appropriation by Congress is a markdown of this year's request by the agency made through the Office of Management and Budget. To test this model, they looked at budget requests and appropriations for more than a hundred agencies from World War II to Fiscal Year 1963, and found that with few exceptions such a model fit well.

One of the significant results of this early work was to show that the budget process is much more stable than it had previously been thought. With regard to some agencies the budgetary process remained stable for five to ten year periods; in others it did so throughout the post-war period. However, analysis of certain shifts in behavior detected statistically showed that to predict major changes in an agency's budget requests and appropriations one would need to include in the model exogenous variables such as political changes, social shifts and changes in the economy.

In more recent work (11) the Budget group has developed a model in which the political composition of Congress and the Presidency, budget deficits, unemployment, the price level, and other variables were shown to have significant influence on a given agency's budget process. Testing this extended model by its ability to predict the data of five recent years, they found that the Federal Government does actually react to the same factors as the rest of the economy. With these factors taken into account the extended model was a better predictor of the results of the budget process than the original model.

Although the extended model fit well overall, the results were less impressive in explaining the Executive, or request, side of budget development than in explaining the Congressional, or granting, side. Originally, the group hypothesized that this was because the agencies were closer to the "real" world and thus their requests would tend to more closely and quickly reflect changes "outside" government. In this case the inclusion of the exogenous variables in the extended model should have brought the level of explanation of the requests up to those of appropriations. However, this was not found to be the case. The group was thus required to look elsewhere to explain the

problem. Professor John P. Crecine (POSTS Fellow-1973/1974) had been working on a model for understanding the relationships *between* agencies, that is, how the budget of one agency tends to influence the budget of another. During his work on the budget of the Defense Department, he had developed a model called "Proportional Cut." The essence of this model is that the total of agency requests for the department are compared with the President's dollar amount planned for the department, and the difference—which is invariably positive—distributed proportionately as cuts to the agencies' requests. In this way each agency takes its share of the cut called for by the President's proposed figures. Crecine had made limited tests of this hypothesis on Defense Department data; the group applied full tests of the "Proportional Cut" model to the Defense Department (using Crecine's data) and to the Post Office and then to a larger sample at the level of Office of Management and Budget Divisions. The model was found to predict inter-agency budget behavior on the Executive side of the Budget Process with only a few exceptions.

While testing the "Proportional Cut" model, Davis, Dempster and Wildavsky discovered that some agencies had negative budgets in some years, that is, they were projected to operate in such a way as to have a surplus at the end of the fiscal year. Since this surplus virtually never occurred in practice, the group was led to question how these negative budgets came about. During the presidency of Lyndon Johnson, the government began to use a cash consolidated budget which included trust funds, loan programs, and several other areas which had previously been separate from the administrative budget. Economic advisors had encouraged this accounting change because such funds obviously influenced total federal expenditure. With such funds included, the consolidated budget theoretically became a more useful document for making projections about government expenditure policy and the economy. A straightforward example of such policy-making within the cash consolidated budget concerns unemployment—the government projects unemployment figures to determine how large unemployment expenditures will be for the Department of Health, Education and Welfare (HEW).

It was realized by the Johnson Administration, and subsequently by the Nixon Administration, that the consolidated budget made it possible to adjust such projections—since Congress had no basis on which to question them—so that it appeared that the budget was within politically desired bounds. For example, if the Executive branch projected unemployment figures lower than they were actually expected to be, it would appear that HEW would be spending less that year, and would therefore appear to Congress and the public to leave a smaller budget deficit than was internally forecast. The result would be a gap between internal projections of government behavior and economic policy and those announced in the Budget Message to Congress. This is an obviously unwelcome example of the political process directly impinging on economic policy. In recent times the practice appears to have been explicitly stopped by Executive Order of President Ford.

The models of government behavior developed by Davis, Dempster and Wildavsky can be used to close normal econometric models which take into account the rest of the "real" world. In much economic theory, the government is seen as an agent essentially acting outside the economy to change it. The group's models of the budget process show that government expenditure policy is not an exogenous force, but rather acts as an endogenous variable in the whole economic system. Government reacts to economic and social variables with varying lags. Macro economic totals for domestic and defense spending are set at least 18 months in advance of any possible spending in the economy. The average lag involved is probably closer to 24 to 30 months from the initial planning of target figures, through appropriations, to actual expenditure by the spending agency. This suggests that little power is left to governmental policy-making except in times of crisis such as high unemployment and/or rapid inflation, when direct action by Congress is required. Dempster and Davis are now developing a macro-economic model of a developed western economy which they feel comes much closer to the real world than standard Keynesian or Monetarist models.

Otto Davis

With several co-authors, Otto Davis analyzed data concerning three organizational activities: the FCC and broadcast licensing; turnover/absenteeism; and the schools and student "achievement." Publication of these papers is forthcoming.

In 1965 the Federal Communications Commission (FCC) produced its *Policy Statement on Comparative Broadcast Hearings*. This statement set forth the criteria used by the FCC to assign radio broadcast frequencies. The underlying basis given for the policy is to choose the applicant who will best serve "the public interest." Davis and M. A. Frederking (State University of New York at Buffalo) programmed the criteria set forth, and then simulated FCC decision-making by applying this program to 98 actual applications in competition for 38 broadcast licenses. The FCC policy is complex, cumbersome and vague in certain areas. Also, the information supplied by applicants is sometimes incomplete and/or vague. Nevertheless the authors' simulation matched the FCC's actual choice of applicant in 86 percent of the cases. Although this indicates that the FCC generally adheres to its objective criteria, there may be some problems with its decision-making process. There are three bodies in the FCC which successively review each case (Hearing Examiner, Review Board, Commission). In 9 of the 38 cases considered, these bodies differed about which was the best applicant. The authors note that as minority groups become more insistent on gaining their share of control of the media, such inconsistencies within the FCC may be challenged.

Davis, M. L. Joseph (Carnegie-Mellon) and W. O. Perry (Carnegie-Mellon) compiled data from another study concerning the National Alliance for Businessmen—Job Opportunities in the Business Sector

(NAB-JOBS) program in which members of NAB encouraged private corporations to hire the "hard-core unemployed." Training for such hires was then provided with financial support from JOBS. Most previous studies considered absenteeism simply as an analogue of turnover and assumed that the two have identical determinants. The fundamental hypothesis investigated in this paper, on the other hand, is that there is a simultaneous (feedback) relationship between termination (voluntary or involuntary) and absenteeism. It is assumed that the two do not have identical determinants. The authors argue that when employees are dissatisfied with their jobs, but have not yet found alternative employment, they tend to be frequently late or absent. This allows the employee to temporarily withdraw from the unsatisfactory situation without losing all the benefits of employment. When dissatisfaction increases even more or the employee finds another job, he or she finally quits. Thus, absenteeism may be one of the most significant indicators of prospective turnover. The study also shows that involuntary termination (being fired) is strongly related to absenteeism. Many NAB-JOBS participants were fired for absenteeism even when their performance on the job (when they were there) was satisfactory.

In 1964 James Coleman collected educational data on more than 16,000 twelfth-grade students. These data included the students' achievement test scores, and their answers to a detailed questionnaire called the "Equality of Educational Opportunity Survey" (EEOS). A. E. Boardman (U. of Pennsylvania), Davis, N. Johnson (Carnegie-Mellon) and M. T. Sanday (U. of Pennsylvania) have reanalyzed this information through the use of simultaneous equations models in order to examine more closely the interactions among variables in the education process. Most previous analyses have modeled the education process as a single-equation production function in which achievement is the output. The authors note that although achievement is one important result, it is not the only one that is significant in preparing for a career or other adult activities. Moreover, the factors contributing to achievement (or failure) are related to each other in a much more intricate way than can be shown in a single equation. The authors' research shows feedback relationships between variables (not simply reciprocity) and it provides a fine mesh analysis of how exogenous variables affect endogenous variables.

Michael Dempster

The data base for the U.S. Federal Budget project (see above) is large and unwieldy; which variables best explain the dynamics of the situation is not apparent. While working on that project, Dempster was therefore led to develop new statistical procedures for selecting explanatory variables in multiple regression studies, and he designed and supervised the writing of a very large computer program to effect such procedures with high numerical accuracy. These amount to procedures for automatically identifying the variables influencing a process under study. A paper reporting this work is currently in preparation. The techniques developed can have wide application in

the social sciences because much of the work done in that broad area concerns large data bases and large numbers of possibly relevant explanatory variables.

About half of Dempster's time at the Center was used for his collaborative work on the U.S. Federal Budget; the rest was spent in essentially pure mathematical research. He made considerable progress on a long-term program for developing abstract foundations for optimization and control in applications as diverse as management science, mathematical economics and rocketry. Together with Professor Roger J-B. Wets of the University of Kentucky, he developed a calculus-like fundamental theory of optimization in abstract spaces. An important part of the work was concerned with a study of the nature and representation of structures dual to those involved in the original specifications of the problem. The introduction of "dual variables" into an optimization problem yields more information about the original situation. For example, the optimal trajectory of a rocket can be studied as a single element of an infinite dimensional vector space. To each primal variable measuring the physical state of the rocket at an instant of time can be associated an instantaneous dual variable which can be shown to be the change in the optimal value of the objective criterion when at that instant the dynamical equation for that variable is relaxed by a unit. In such a problem, the time trajectories of the dual variables form an element of the dual vector space of the space of trajectories for the primal variables. The two spaces are tied together theoretically by the operation of integrating their product over time. When the trajectories are bounded in the state space, one is dealing with a space of essentially bounded functions. Another branch of the general program, completed in conjunction with Peter M. Lewy, a graduate student at Oxford, concerned the dual of this space. Lewy and Dempster were successful in providing a detailed representation of the dual space of the space of essentially bounded functions. The results of this work have both practical and purely mathematical applications.

In addition to his mathematical research, while at the Center Dempster advanced his long-standing interests in formal modeling of mental processes and in the mind-body problem. He began joint work with Professor Robert Shaw of the University of Minnesota (Center Fellow during 1974/1975) which is aimed at testing the feasibility of human intuitive perception of space-time and other higher dimensional structures. Shaw had developed the idea that the brain encodes perceptions in terms of transformations under which the incoming information is invariant. Such a model of mind requires much less storage and processing space in the brain, since brain function is vastly simplified. This is a possible explanation of the human brain's enormous storage and processing capacity.

Humans process information in three simultaneous dimensions rather than in four, but it is possible that we are capable of a better understanding of the fourth dimension than has previously been known. To test this, Dempster first solved the problem of generating,

with the use of a computer, four-dimensional figures in various "poses" corresponding to a group of transformations with a given generator. He and Shaw will present these to experimental subjects together with figures which are not properly constructed. Shaw's past experiments have shown that anyone can quickly learn to intuit without error whether or not a *three*-dimensional figure has been properly manipulated according to a group of transformations. This project will determine whether people can also learn to intuit when four-dimensional figures have been properly manipulated. If they can, it will support the idea that people are capable of thinking in four-dimensional representations. Such a model might assist in explaining phenomena such as precognition in humans.

Aaron Wildavsky

Last year, Wildavsky studied policy-making in several large areas of concern, including international affairs, the domestic political structure and the health care system.

Beginning in October 1973, the Organization of Petroleum Exporting Countries (OPEC) raised its prices 1100 percent. This has caused a "catastrophe" in world economic and political order. With Edward Friedland and Paul Seabury, both of the U. of California, Berkeley, Wildavsky has written a book about this catastrophe (39). The authors say, "The crisis will not be short, nor limited in effect. The change is systematic." They draw a scenario of the present and future damages to world order created by the great flow of wealth to the OPEC nations. One of the major problems is that the developing countries cannot afford the oil needed to transport fertilizer to produce food. In all countries the increased oil price triggers inflation and unemployment, and it causes tremendous balance of payments deficits. The oil "producers" try to find ways to handle their great wealth: if they make short-term investments, frequently transferring funds to avoid expropriation, the order of the oil importers' investment sector is disrupted; if the exporters invest in long-term transactions, the importers may lose control of their own economies. The authors state that we should consider all options to drive the price of oil down.

In an article on the past and future of the U.S. Presidency (38), Wildavsky suggests that the mutual relations between the President and the people are flawed. When all presidents ". . . fail . . . when, moreover, all known replacements are expected to fail, the difficulty is not individual but systemic." In the future the scope of government is, if anything, likely to enlarge, and so the President is likely to be more important. Power will become more concentrated in the Presidency because anti-secrecy reforms and the decline of seniority in Congress decrease powerful cohesion there, because political party reform laws weaken those organizations and because the courts can only react to illegal actions of the President rather than control future choices. Wildavsky predicts that the Presidency will also become more isolated from the legislature and the bureaucracy. As the nation's problems become more complex, future Presidents will attempt to simplify the demands made on their attention by creating a small

group of "super-secretaries" with jurisdiction over several departments. Wildavsky believes that it is important to maintain a system of checks and balances, and to do that we should help institutions, such as the political parties, the Congress and the media, to grow.

Most people are healthier today than people like themselves have ever been, and most people feel that their own doctor is good. Studies show that further improvement of medical care in the U.S. would do little to improve health. Yet polls indicate that one third to two thirds of the population think that the medical care system in the U.S. is in crisis. Wildavsky proposes, in a forthcoming article, that the reason for this is that implicit aim of medical care is not so much improved physical health as equalizing access to medical care. As most doctors would point out, many patients need more "caring" than "doctoring." The government has largely become more concerned with equal access to caring (i.e., medical care) than with improved health because medicine, at the margin, does not improve health. Determining how much medical care is sufficient is difficult enough; determining how much caring is necessary is virtually impossible. Since medicine is not an exact science and since psychological benefits are involved, there is always one more drug or treatment that might be administered to improve the patient's well-being. Consequently, patients and doctors tend to resolve their uncertainties by using medical care to the level of insurance and subsidy. Policy makers should take this tendency into account.

Other Individual Fellows

Garry Brewer

As a senior staff member of the Rand Corporation, Brewer has analyzed several topics largely neglected in the relevant fields, including problems with model building and planning for the termination of war.

In a Rand Paper (6) Brewer shows that many models, simulations and games (MSG's) developed with the support of government funds are misused or underused for various reasons involving the policymakers, the model builders and their interactions. Brewer states that one needs to define clearly the purposes for which a model-building project is being undertaken, especially those motives which are not technical. Other motives include the use of MSG's to defer making a decision or for advocacy. On the other side, models are often used poorly because the technician is more interested in building the model than in explaining its substance and use to a policymaker. Documentation of many large-scale models is scanty at best. This makes it very difficult for someone other than the original builder to use the model or to begin asking different questions than those initially asked. Misuses of models also occur because technicians are aware that if they validate the client's original "hunch" the client is more likely to offer them follow-on contracts or promotions. Brewer also emphasizes the importance of appraising a model throughout its development as well as at completion, preferably through external professional review.

Brewer and co-author J. L. Foster (Rand Corporation) state in another paper that little attention has been paid to the termination of war (8). Once a war has begun, political objectives are rarely clearly defined for various reasons, including the complexities of the value trade-offs involved, the collective aspect of government decision-making, and the problems involved with informing allies and enemies of the country's political objectives when a war is in process. Yet, since World War II, the conflicts that have developed have been terminated short of all-out destruction of the adversary. This has been due to the restraint of the great powers; the time needed to mobilize an army, which allows for political control of the situation; a doctrine of limitation; and a common strategic language. However, the rules of the game do not pertain in the case of a nuclear war. Great destruction can occur very quickly, before the political protocol which restrains conventional warfare can be effected. Communications systems are the most likely first targets of nuclear attack. Even if a decision is made to terminate conflict, how can the bombers be recalled? If political leaders are killed or isolated from military leaders, the latter must assume responsibility for the conduct of the war. Since traditionally the military pursues victory within limits set by the political leadership, this could easily lead toward escalation of the war until all-out destruction is achieved. How, why and when to end a war needs to be studied further, especially in the area of developing doctrines and strategies that, while aiming primarily at deterrence, also offer the possibility of ending war within the limits of reasonable objectives and at acceptable costs.

Brewer also devoted considerable time last year to one of his major interests: the care of handicapped children. With J. S. Kakalik of the Rand Corporation, he wrote a paper (7) summarizing a two-year research effort undertaken at the request of the Department of Health, Education and Welfare to study the many major federal programs and hundreds of state and local programs that serve the special needs of 9 million mentally or physically handicapped children in the U.S. The researchers found that the current service system is very worthwhile, but that it could be improved in four major areas: 1) Insufficient resources—by the most conservative estimate, about 40% of the handicapped children are not receiving the special education they need. 2) Inequity—various states spend widely varying amounts on handicapped residents. 3) Lack of planning, coordination and information. 4) Gaps in services—the authors found that programs are severely lacking for prevention of handicapping problems, identification of them, and direction of the child's parents to match the child with the appropriate mix of services.

In another project, Brewer and S. Marshall (Russell Sage Foundation) focused on this need for "direction," that is, the accurate assessment of a child's service needs through time and the matching of those needs with locally available services. The Russell Sage Foundation provided funds for Brewer and Marshall to produce a film which would explore this problem, highlight policy recommendations con-

cerning it, and show how the proposed implementation worked. The film has been completed and is now being shown to selected audiences in the cities where it was made, with plans for wider distribution later. The film is entitled, *What Do We Do Now?*, and it provides a view of a working center, the Golden Gate Regional Center for the Developmentally Disabled in San Francisco, "the best partial model in operation." In addition to being an exploration of the substantive problem, this project was an experiment in using film to disseminate research results, a medium seldom used by social scientists. Brewer and Marshall found film to be a compelling vehicle for their ideas.

Brewer and J. S. Kakalik (Rand) have also researched mental health and mental retardation services in Nevada. In a lengthy report (9), they show that at least 11,000 people with mental health disorders, at least 11,000 mentally retarded people and at least 44,000 alcohol or drug abusers needed some type of substantial services in Nevada in 1975. This report summarizes the findings and recommendations of the study of all major services and service delivery programs for these different groups of people. It describes all major public and private programs intended to meet their needs, documents problems encountered in services and programs, and presents recommendations for improvement.

Jacob Fine

Fine is concerned with developing a system for periodic monitoring of the quality of care given by the practicing physician, to be administered by a National Board of Peer Review, which would function in many respects like the National Board of Medical Examiners.

He says, "Doctors make mistakes. Some mistakes are inevitable. Thus, it was impossible to foresee that blindness would be caused by giving oxygen to premature infants. Other mistakes, like those that result from the need to act quickly, are understandable, and must be allowed for. But after these are discounted, an imposing amount of substandard performance by physicians remains, whether because of oversight, overwork, insufficient expertise, or because of inadequate assessment of the issues that govern the decision to act."

Currently, review of the individual doctor's performance is well done in teaching hospitals; but in community hospitals it is all too often not much more than a formality. The Federal government has recently instituted the review of care given by physicians whose services are paid for by Medicare or Medicaid. This system (PSRO) undertakes to monitor the management of each case by paramedical personnel under the supervision of a physician to see that the reason for admission, the length of stay, and the use of drugs and services conform to a set of criteria for the disorder under review. The primary objective is to control costs, but there is good reason to be cautious about how much it will achieve in upgrading the quality of care. It will identify the grossly deviant; but a good deal of substandard care will escape assessment, care that relates to judgments which cannot be articulated in explicit terms, yet are controlling forces in the management of the patient.

To supplement PSRO, Fine proposes a system of peer review operated by an independent non-political agency, employing paid physician-reviewers competent in the specialty under review. They would rate quality as "satisfactory" or "unsatisfactory" by retrospective review of a sample of the record of the physician's hospital and ambulatory patients. Opponents of peer review have claimed that there are few conditions for which one can insist on a single approach under all circumstances. The ratings are based upon implicit as well as explicit review. They allow for regional differences in modes of practice, but not those that are below a national standard set by specialty boards. The validity of the method of rating was tested, in collaboration with the Stanford Quality Assurance Program, by the use of five reviewers to rate the same set of records of a given disorder. Consensus in ratings of three hundred records was more than 87% and 90% respectively for two common clinical disorders. This degree of consensus justifies further testing of the method as a major instrument for the purpose of identifying those whose performance needs to be improved in the interests of the medical profession as well as the public.

Eliot Freidson

In a recent book (13) Freidson reports the results of a qualitative study of a "model medical group" set up to be as close as possible to the ideal of liberal medical reformers. The group operated on a pre-paid basis, and the physicians were employees on salary. Freidson's purpose in the study of this group was to "assess how formal schemes are likely to be carried out in light of the way physicians make sense of their work and its problems. I shall show how, down at the level of everyday medical work, the physician transforms the intent of the formal scheme to make it compatible with his own conceptions of need, propriety, and convenience." Data were gathered for this study by means of interviews with the physicians and with the group's administrators.

It is often believed that in group practice doctors will monitor each other's performance, and that costs will be lowered through economies of scale and through more efficient use of specialists' time. Freidson found, however, that the group did not function as smoothly as one might have expected, partly because the physicians generally had a self-image in which they were "special people especially deserving of trust." The doctors "relied heavily on a special conception of themselves as professionals." Thus, the rules of the group, and the administrators attempting to enforce those rules, were largely ignored when they conflicted with the physicians' own ideas of how to practice medicine. Abuses of group practice, such as tardiness, avoiding house calls, and excessive tests; and abuses of good medical practice in general, could not be controlled by the administrators. Freidson says, ". . . the formal authority in the medical group was neutralized by its holders' reluctance to employ it and, perhaps more importantly, by the unwillingness of the working physicians to grant it legitimacy."

Since the administrators were unable to control the group, one would expect that the physicians would develop informal controls among themselves, especially in regard to quality of care. And in fact, such controls did exist, but they were applied with a very light touch. A physician might talk to another about repeated offenses, but was likely to go no further than that even if the offender continued to be delinquent. It was considered "impolite" to press the issue. Moreover, most mistakes were "normalized" by the offender and others in the group through the belief that errors were inevitable given the heavy workload and the imprecise nature of the practice of medicine. Freidson concludes that proposals for a comprehensive national health system which would include systematically applied controls on performance have not adequately addressed the problem that physicians are likely to covertly resist such control.

Robert Haggerty

Studies show that most education does little to improve health habits. The few techniques that have been successful have included active involvement by the student in the learning process, such as student discussion of the merits of a good health habit, rather than passive information transfer, such as the use of educational pamphlets. Behavior modification methods have also been successful (e.g. in helping students quit smoking) but their use is often spurned because many educators think such techniques involve mind control. Haggerty notes that students are not forced by these methods to act in ways they do not wish to. In fact, modern "behavioral" techniques rely heavily on *self*-reinforcement. Religious groups, such as Mormons, have for years provided social reinforcement for good health habits in their members. Haggerty proposes that health educators work through social organizations, such as religious groups, to promote changes in life style.

Haggerty lauds the development of the new government-funded Center for Health Education for Disease Control in Atlanta, Georgia. He advises the staff of this Center to develop ". . . . a coherent strategy . . . involving all the ways to change behavior rather than the fragmented disease by disease, method by method approach used to date."

Gudmund Hernes

Hernes was involved in two major projects last year. In Norway he is the Research Director of a comprehensive study of the distribution of political and social power in his country. This large project was commissioned by the Prime Minister's office, and it is financed by annual grants from the Norwegian Parliament. Hernes also worked last year on a government-sponsored study of various income and status levels in Norway.

The "Levels of Living" material has not yet been published so it will be described in the next POSTS General Report. Hernes has published (in Norwegian) a theoretical framework for the study of power (14). An English version of this book, to be called *Power and*

Powerlessness, is now being completed. Hernes and O. Berrefjord have also published a paper laying the theoretical groundwork for an empirical study of the interface between large firms, their interest organizations and the state (16). The English translation of the title of this article would be, "State Building and the Diminishment of Markets."

The theoretical point of departure for Hernes' work on power is a model for collective decisions first developed by James S. Coleman. Hernes focuses on extending and applying this framework for the study of social power. For example, in a forthcoming paper, he uses Coleman's model to explain and separate several meanings of the term "power" as it is currently used. In Coleman's model, purposive actors take an interest in events whose outcomes affect them, and each actor can affect the outcomes of some of the events. An actor's interest in an event is equal to the difference its outcome makes to him; his initial control is his influence over the outcome. The conceptual building blocks are actors and events related by interest and control. The *relational* aspect of power is involved when a "distance" exists between what an actor initially controls and the final control that he wants. To close this distance, the actor exchanges control of what interests him little for control of what interests him more. This can be a bilateral agreement, or a more complex collective transaction.

Hernes, employing this model, shows that "power" can be understood in terms of "autonomy" and "dependence" by calculating an actor's dependence on another actor. This is done by multiplying the first actor's interest in an event times the control the other actor has over that event, and summing for all relevant events. The *general* power of an actor, then, equals his fraction of control over events, with the events weighted by the interest other actors have in them, events becoming more valuable the more powerful the actors are who take an interest in them. Since this concept of general power expresses the relative amounts accrued by each actor, it shows the *distributive* aspects of power. The final control an actor obtains over an event (after all transactions have taken place) is proportional to his interest in it and to his power. The impact an actor has on the outcome of this event depends on how he allocates his resources in obtaining control over that event. This shows the *allocative* aspect of power.

Of course, actors often disagree about what would be a desirable outcome for a given event. Opposed interests can be thought of as directed interests; the power of the *collective* is then equal to the sum of directed interests in it, with each actor's interests weighted by his power.

In another paper, Hernes shows that Coleman's concepts for a system of divisible events are isomorphic to concepts used in economics to describe a pure-exchange economy. For example, actors in an economy can increase their satisfaction by exchanging part of the stock of some of their commodities to obtain more of another commodity. Likewise in power relationships, actors exchange control of what interests them less for control of what interests them more. The

resources an actor holds consist of the sum of the initial endowment he has of different goods, each weighted by its price; similarly, the power of an actor is the control he has of the outcomes of different events (goods) each weighted by the interest of other actors (the price set by the marketplace).

Hernes further examines the idea of similarities between social exchange and economic exchange by looking at Thomas Hobbes' model of collective decision-making as given in *Leviathan*. Hernes shows that the model assumes *exchange* between actors; i.e., a *market of transactions*. Implicit in this concept is the idea of commutative justice; that is, actors exchange things of equal value, or equal fractions of control over the total resources in the system. Thus, an actor's purchasing power is determined by how many of the total resources in the system other actors would give for the use of his power. Hernes shows that by using the above concepts, the power of an actor and the way that power changes can be described formally in economic terms of pure barter. Many features of Hobbes' model of political power have the same basic logical structure as pure exchange for private goods and services.

In a state of nature the *external effects* of an actor's choices are greater than the *internal* effects; an actor can affect another's welfare more than his own. This leads to a life of uncertainty and fear, and as an economist would say, there is an opportunity cost of remaining in this condition. Hernes points out that Hobbes shows it is rational for actors to exchange control of each other's choice of action, thereby establishing a "commonwealth." However, trust between actors is needed for this; natural persons establish "trust" for a commonwealth by transferring control over punishments to a collective body. *By collective action, men change the reward structure so that it no longer becomes individually rational to choose a course of action that is collectively harmful.*

Hernes also explores the exchange of control in a specific context; namely, in legislatures. William Riker and Steven Brams have argued that in legislatures a "paradox of vote trading" may arise; i.e., although all members make rational trades which are advantageous to the traders, the sum of the trades, due to external effects, are disadvantageous to everybody, including the traders themselves. Riker and Brams also state that the paradox of vote trading "is inescapable. . . ." Hernes argues, however, that external constraints which render vote trading inefficient for the group of members as a whole *can* be overcome. Externalities occur because a market does not exist which is equal to the opportunity cost of remaining in the inefficient state. Members of the legislature must make new contracts with each other to establish a *market* for the control of trades. Such "meta-trade" would involve exchange of the control over what trades the other should enter into. For example, if there are three members of a group, the highest utility possible for members #1 and #2 is obtained if one exchanges his vote for a promise from the other that he will not enter into a contract with anyone else in the next vote, thereby forming a

coalition. This type of agreement is very useful to members #1 and #2, but very costly to #3. Should members #1 and #2 exclude #3? Because control of the actions of others is more valuable than control over one's own vote, and because a series of votes occurs, it eventually behooves members #1 and #2 to give member #3 control over their next votes. Since member #3 loses utility when #1 and #2 contract with each other, #3 then tells them not to trade. Consequently, all three vote "sincerely" and gain the highest collective utility possible.

In order to create a model that describes structural change without glossing over either the continuing influence of individual choices on the environment (social, economic, political and physical) or the continuing effects of the environment on individual choices; Hernes proposes in another paper that we look at stability and change as process outcomes generated by interrelationships of the component parts of the system. He emphasizes the dynamism of these interrelationships, noting that other analysts have tended to assume greater stability in the parameters and operators of a given process than there actually is. For example, some anthropologists have tended to assume that a society's reward structure is constant, whereas actually the actors who receive the fruits and punishments of that structure continually influence the structure itself. Although the structure may be in equilibrium, it is not static.

Hernes then describes four types of change processes, labeling them: "simple reproduction"—worn parts of a process are steadily replaced to maintain the status quo; "contracted or expanded reproduction"—the number of parts in a process is expanded or contracted, but the process remains largely the same; "transition"—the functions of a process remain the same, but the parameters of the process change, thereby changing the outcome; and "transformation"—the functions *and* parameters of a process change, drastically changing the outcome. Hernes describes one interesting and important type of transformational change, that which occurs when a process is simultaneously destructive and generative. Marx's historical materialism model provides an example of such transformation. To increase its wealth, the bourgeoisie makes conditions favorable to creating a large working class, but these conditions eventually undermine the existence of the bourgeoisie itself. Such a process, which is simultaneously productive and counter-productive, can be called "dialectical." Hernes emphasizes that when analyzing a social structure one should consider what problems that order creates—problems which, when men try to solve them, could radically transform the structure.

Joshua Lederberg

In February 1975, 150 experts from around the world met at the International Conference on Recombinant DNA Molecules to discuss openly the wisdom of pursuing genetic engineering research. Lederberg attended that meeting and has been an active participant in the continuing debate on this controversial subject. In a recent paper (17)

he expressed his view of the matter. He begins by explaining that we now have the technical capability to fragment animal or human DNA into perhaps a million segments and transfer a single segment to a bacterial host for study or for production of large quantities of a specific DNA segment. This technique of gene implantation can also be used to transfer the genetic information from the cell of one species to that of another. Although applications for the "DNA splicing" procedure have not yet been fully developed, such research "promises some of the most pervasive benefits for the public health since the discovery and promulgation of antibiotics." For example, the technique could be used for large-scale production of human proteins, such as the antibody globulins that are currently in scarce supply for medical use. The biosynthetic proteins would make it possible to provide many people passive immunization against such infectious diseases as influenza, hepatitis, herpes and rabies.

Lederberg emphasizes another important reason for continuing DNA splicing research: to learn as much as possible about how to defend against "viral pandemic." A new, virulent strain of influenza, for example, could be terribly destructive if scientists did not have enough tools to quickly develop a vaccine, or some other medical defense.

The potential benefits are great; there are also risks. Many scientists are concerned that DNA splicing may inadvertently generate a new pathogen inimicable to man. Since the procedure is relatively simple, there is concern that people with "less-than-mature" professional and ethical judgment may try to use it. Lederberg emphasizes the importance of making every effort to assess both the risks and the benefits of DNA splicing research to find the optimal balance in its control.

A committee of the National Academy of Sciences has recommended that where hazard is th[illegible]earch is reasonably predictable, laboratory containment p[illegible]es akin to those appropriate for known pathogens should be used. Lederberg agrees with this. He disagrees, however, with proposals that would place extreme security requirements on research involving implausible hazards, such as the introduction of existing genes for antibiotic resistance into other nonpathogenic species. Instead, he believes that the best strategy would be to use safe "vectors," such as bacteria with little chance of survival outside the laboratory.

David Mechanic

Mechanic in interested in the sociological factors affecting and affected by physical and mental illness. Last year he wrote many articles on different aspects of this subject area. For example, in one paper he studies problems in the measurement of stress and social adjustment (22). To analyze the relationship between stress and illness, T. H. Holmes and several other researchers have developed the Social Readjustment Rating Scale (SRRS), a list of life change events, each weighted by a score indicating the expected adjustment required by the event. Mechanic points out that the SRRS is very

useful, yet it has "some important implications that ought to be corrected. . . ." Holmes does not weight events according to whether their effects are positive or adverse. For example, a job promotion and a demotion are weighted equally. The operating assumption is that change *per se* tends to cause stress and increase the possibility of illness. Mechanic shows that this is not necessarily so. There are approximately twice as many items on the scale with adverse effects (e.g. troubles with the boss) as with positive effects (e.g. personal achievement) and many more items than that which could be either (e.g. changes in one's job). For the latter, the investigator does not know whether the change is good or bad. Mechanic thus notes that it *may* be only the events with adverse effects which actually increase the risk of illness. In any case, differentiating events with good and bad effects would help to understand further "the roles that different types of life changes may play in varying disease conditions."

It is known that social class, household structure and other social variables affect various processes related to mental illness and its treatment. Many studies have been conducted showing the relationship between a variable and the response to mental illness. In another article (21) Mechanic points out the need for a "general frame of reference" to tie together these disparate studies. One useful framework focuses on the process of conceptualizing symptoms such that various attributions are made about them (such as their cause and whether they are physical or mental). These attributions are shaped by the symptoms themselves *and* by the sociocultural characteristics of the person. *Sociocultural* predisposition is also one of several influences on whether or not care is sought, and the *type* of care selected. Mechanic suggests that to analyze help-seeking, it is "necessary to distinguish a variety of issues in a way that no existing study has effectively achieved." Such issues include:

1. How are social characteristics related to seeking treatment and how are they related to the prevalence of certain problems?
2. To what extent do certain sociocultural processes relate to the general inclination to seek care and to what extent do they relate to the inclination to seek a certain type of care?

Mechanic and J. Greenley (University of Wisconsin) began pursuing such issues in a study of university students (24). Using a variety of measures of symptoms and incapacity, they compared the types of patients who seek assistance from various helping agencies with those who report symptoms but who have not sought help. Data for this analysis came from a random sample of a student population in a large public university in the Midwest and from consecutive samples of students from this population seeking assistance from the University Psychiatric Outpatient Service and the Student Counseling Center. It was found that more women than men seek help, and that students who are younger than their classmates tend to seek help more than older students. Thus, Mechanic and Greenley suggest that attention be given to younger students and to the phychological adjustment they face.

The results of the study also show a substantial amount of reported psychological stress in the *general* student population. As anticipated, the highest levels of distress were found among those seeking psychiatric assistance, and the lowest levels were found in the random sample, with the counseling sample holding an intermediate position. There was, however, substantial overlap in reported levels of distress between the random sample and each of the samples of students seeking help. Mechanic and Greenley emphasize that this finding should not discourage support for helping services, but rather should encourage it so that the agencies can better deal with widespread situational distress among students.

Mechanic also studied how differences in the organization of health care groups affect the physician/patient relationship. In a recent paper (23), he discusses this issue as it concerns medical services. Information was gathered by questionnaire about 889 primary care physicians in the U.S. who practice either solo, in non-prepaid groups, or in prepaid groups. Data were collected on physician demography, workload, use of various procedures, social orientations to medical practice, satisfaction, and attitudes toward socio-political aspects of medical care. A doctor's estimate of the proportion of his patients' visits that were trivial, unnecessary and inappropriate is a useful indicator of his reactions to patients. The doctor who is likely to think a patient's visit is trivial tends to listen less well to the patient and in general to be less responsive to the patient's needs. One of the more important findings of the current study was that physicians in prepaid settings are much more likely than other physicians to report that their patients' visits are trivial. Physicians in prepaid practice have no economic incentive to cope with a heavy workload by increasing hours as do the solo practitioners. The data show that, instead, they try to squeeze as many patients as possible into the regular working hours set by the group. Mechanic hypothesizes that doctors in prepaid settings respond less well to their patients because they feel harassed by the need to process many patients very quickly. Prepaid groups frequently provide fewer resources for ambulatory care than indicated by demand. Also, in many prepaid groups, patients frequently cannot obtain timely appointments with their general practitioners (G.P.'s); thus, emergency services are overused and the G.P.'s knowledge of the patient's history is not used efficiently. Mechanic suggests that prepaid groups organize in such a way as to make it possible for patients to see their family doctors except in cases of extreme emergency or when a specialist is needed, and that these groups provide their G.P.'s with enough time and resources to meet the needs of their patients.

Uwe Nerlich

A major project undertaken last year by Nerlich (with Johan Holst, Norwegian Institute of International Affairs) was the development of a broadly-based study of the emerging security issues that now confront the North Atlantic Alliance. Contributors to this study, and to

a forthcoming book about it, include analysts from both Western Europe and the U.S. Some years ago it became evident that revolutionary changes were taking place in military technology that seemed likely to have profound effects on defense strategies and doctrines and on alliance relationships. These technologies include those of information sensing, precision guidance, very effective non-nuclear munitions, data processing, and communications. No sudden breakthrough had taken place, but the cumulative effect of improvements in these technologies promised to have an enormous overall impact.

Paralleling these technological developments have been political developments of great significance. They include the weakening of U.S. alliances, the effects of détente, political developments in Europe, heightened tensions and competition in the Middle East, and the continuous growth in Soviet military power. The combined effect of these developments has been to make much of American thinking about threats to her allies, about contingencies, and about possible political-military developments "seem increasingly irrelevant." The study group notes that this is particularly true of planning at the official level, where candor is often difficult, and it is illustrated by a stagnation of thought concerning contingencies in Central Europe. The study group feels that important issues have not yet received adequate attention. These include: (1) the political effects of changes in military power short of actual use, including the prospect that domestic politics in a number of countries might be affected importantly by changes in East-West power relationships; (2) the possibility that limited military actions by the Soviet Union or its allies outside of the NATO area might have a major impact on Western Europe and the U.S. (this concern antedated the October 1973 Middle East War with its consequent impact on the West's energy supplies; (3) selective attack by Soviet forces on parts of Western Europe, especially against the flanks. Nerlich's study group has attempted to examine these issues in a systematic and comprehensive fashion.

A second study concerned the politics of détente. Three models of détente have been suggested in the study. One pertains to the now historical situation which was characterized by a linkage of European security, the German issue and West European integration. Type A détente is explained in terms of opposition to this political framework. Type B détente is most important in recent developments. It explains détente in terms of specific domestic and intra-Alliance interests. Type C détente considers détente efforts as ends in themselves. The study thus far has resulted in several articles (published in German only). There will also be a book length publication.

William Parson

As a Kaiser Senior Fellow in the POSTS program, Parson focused on primary care and medical education. He outlined several of the current problems with availability of primary care in a presentation to the American Academy of Arts and Sciences (12). A survey taken in 1971 showed that 75% of the people in the U.S. felt there was a

crisis in medical care. A large part of the concern was over availability of care. Primary care is considered to be that which is most accessible and which involves continuing responsibility and personal involvement on the part of the physician who provides treatment or referral for a special problem. Parson notes that it is this type of care which is most problematic in the U.S. delivery system. In 1971 there were about one third as many general practitioners (G.P.'s) in the U.S. as there were in 1930, yet the total U.S. population increased dramatically. This decline may be partly because G.P.'s are often accorded less prestige than specialists, and because the medical school model does not encourage the students to enter primary care areas. Medical school personnel are highly specialized and so the students see the rewards of specialization rather than the satisfactions of general practice. In addition to problems of specialty mix, lack of availability of care is compounded by the general movement of doctors out of rural areas and out of the inner cities to the suburbs.

Both Federal and state governments are now attempting to correct this geographic maldistribution and the imbalance in specialty mix. Several legislative proposals are being considered in Congress to apply economic pressure to medical schools to train doctors in rural and inner city areas, and to encourage establishment of practices in these areas. Likewise, many state schools have been directed by their legislators to create family practice departments, and departments of internal medicine are now almost universally in the process of establishing programs to train "general internists." Perhaps such changes are having an effect; last year at the University of California, San Francisco, 80% of the medical school graduates selected primary care fields.

David Mechanic and Parson wrote an article last year (25) dealing with one aspect of primary care delivery: the proper use of shortcuts. The emphasis in medical schools has been to teach the student to be thorough. However, primary care physicians are sometimes criticized because, in trying to cope with too many patients, they take "shocking" shortcuts. Also, a good primary care physician needs to have deep knowledge of the physiological pathology related to mechanisms of serious disease, but he or she must also have a practical understanding of how to efficiently manage the common problems that most patients bring to doctors. Mechanic and Parson propose that to solve these dilemmas medical schools should teach not only classical clinical methods, but also shortcuts which, the authors point out, are simply "strategies for intelligent action." The pressured primary care physician will then be prepared to use the appropriate shortcut when needed. He or she will also learn to understand the trade-offs between handling an apparently "routine" problem as quickly and economically as possible, and exploring it in greater depth. The authors recommend that mature medical students be taught to focus on economy of time and money while they are in school instead of by trial and error in practice.

Osler Peterson

Peterson is concerned with the costs and the quality of medical care, particularly in the area of surgery. In a presentation to the American Academy of Arts and Sciences (12) he discussed the question: Is Medical Care Worth the Price? Peterson, Sally Jones (Harvard) and John Carr (Harvard) are now completing a study of New England hospitalizations in 1962 and in 1970. During the period 1962-70 the consumer price index for all items rose 28.5%, whereas nationally medical care prices increased by 44% and hospital daily service charges by 120%. Overall, the total charges levied on the non-Medicare population increased by 169%, whereas those incurred by the Medicare eligible population went from $75 million to $300 million — a jump of almost 300%. The sharply increased demand for hospital care that followed the Medicare legislation created a severe "demand pull" inflation. Martin Felstein, writing in *Scientific American* (September, 1973) made the point that the growth of hospital insurance tends to make hospital care more expensive, and these high costs encourage the purchase of more hospitalization insurance. The proportion of hospital bills paid by patients has diminished to a point where out-of-pocket expenses no longer constrain hospital use. To date there has been no general mechanism for rationing hospital care in order to temper inflation, although a thoughtful reduction in hospitalization would have no adverse effect on health. In the New England study it was found that of the top thirteen health problems treated through hospitalization at least five could be treated as well or better through ambulatory care.

Peterson continues this argument in a forthcoming article about the possible impact of national health insurance. He notes that it is expected that a comprehensive national health insurance bill will be passed soon to overcome widespread dissatisfaction with medical care in the U.S. Peterson encourages us to look closely at the proposals for such insurance and to consider how they will variously affect cost, access to care, and quality of care. Some of the proposals for health insurance provide for fees and other economic incentives to constrain demand for hospital and other care, and thereby curb inflation of medical costs. Other proposals encourage formation of group practice organizations (often referred to as HMO's — Health Maintenance Organizations) which characteristically have incentives that encourage physicians to ration hospital care. Peterson believes that the latter would be a more effective means of controlling costs.

Access to care is a problem in the U.S. primarily due to the declining number of general practitioners (G.P.'s). Peterson emphasizes that the passage of any general health insurance legislation will "for the first time establish medical care as a right. The implied promise of access to care from a system seriously deficient in family physicians will inevitably involve the government in direct manpower planning . . ."

Although it is very difficult to measure, average quality of care in the U.S. is probably not as good as the average in many developed countries. Research shows that survival rates for a particular disease generally vary directly with the amount of experience physicians or institutions have in treating that disease. One of the reasons the U.S. lags in quality of care is that medical care here is not organized to channel patients to more experienced doctors and facilities. Peterson and others have pointed out that the quality of care in HMO's tends to be better than that in other types of practice, partly because HMO's are able to keep highly specialized physicians busy. In sum, Peterson believes that federal attempts to regulate quality are likely to bog down in bureaucratization. Rather, U.S. doctors should be allowed, as their English counterparts have been, to innovate ways to maintain high quality.

The American Surgical Association and the American College of Surgeons have jointly undertaken a 5-year study of surgical services in the U.S. (26). In the book reporting on that study, Peterson and his colleagues identify three components in the improvement of medical standards in the U.S., and recommend that they be incorporated in a combined program of continuous control of residency output and board certification rates, stricter hospital credentialing, and periodic reassessment of hospitals and medical personnel as to fitness, performance and competence.

In a forthcoming paper, Peterson and several colleagues report the results of a project to study the relative merits of two surgical procedures used to treat duodenal ulcers. Peterson *et al* drafted sets of medical and statistical criteria and then applied them to published studies of the two treatments in question. The available evidence showed that the procedures probably yield equally good results. The authors also drew from their work broader conclusions about medical research. Many studies are based on statistically small samples, so that to analyze the efficacy of a given procedure it is necessary for the researcher to consolidate the findings of several other research efforts. The authors point out that ". . . the published reports make this process unnecessarily difficult." For example, many of the studies consulted gave no clear and precise definition of "intractable," so it was difficult to know if that term had been applied in the same way in the various research reports. The authors show that follow-up is also a serious problem because of the high percentage of patients leaving each study for one reason or another. Although tracing such "lost" patients is difficult, the authors show that it can be done if one is persistent, and it must be done to avoid biases.

George Quester

Last year Quester conducted several inquiries into the modern strategies and technologies of international military affairs. In a comprehensive book (30), he considers the impact of offensive versus defensive strategies. Quester uses the term "offensive" to

refer to military technology and techniques which reward taking the initiative in an attack. Weapons systems that are potent for limited durations, such as airplanes which must refuel on land, tend to favor offensive strategy. Mobility, such as that of the armored tank, also encourages striking first. On the other hand, permanently fixed weapons, such as those placed along the Maginot Line, and strategy which depends on the local environment to be effective, such as certain guerrilla tactics, tend to promote defensive advantages. Quester shows historically how military and political attitudes toward defensive versus offensive strategy have contributed at different times to war and peace, and how changing weapons technology has also influenced the initiation and costs of war.

Quester's main thesis is that although defensive maneuverings in a war will be costly if a true stalemate develops and neither side is willing to concede, in general a defensive stance is more likely than an offensive position to promote peace. For example, Quester shows that the introduction of the aircraft carrier influenced Japan's entry into World War II. The aircraft carrier favors the offense because whichever side launches its airplanes first and deploys them over the other side's fleet can use its firepower most effectively. Quester says that critics should not so much condemn Japan's treacherous aggression as they should lament the forms of military technology that made the surprise initiative so tempting.

Continuing this idea in a recent article (29), Quester notes that because the defensive capability of many nations was low after World War II, the possibility of war was high. However, by the 1970's "defensive strengths reemerged." Nations have become less concerned about internal rebellion, Vietnam and other guerrilla wars have shown that local power is more important in a civil war than power supplied by outside forces, economic interdependencies have dramatically increased, and the tensions surrounding Berlin and other border areas have been largely defused. Quester believes that these background conditions and others have reduced the vehemence of the Cold War. Whereas a great deal of national energy was previously expended in maintaining alliances, nations "can now revert to assigning higher priorities to issues which are not of the 'East-West' variety." For example, Japan can now devote some of her resources to countering U.S. economic power. Quester says that as "small" nations have become more secure and independent, a multipolar world has again emerged. He believes that multipolarity is *not* the *cause* of peace, but rather the result of conditions largely disposing the world to peace.

Quester believes, however, that this happy situation may be altered by nuclear proliferation. Obtaining nuclear weapons is a shortcut to great power, ". . . and also a shortcut to extremely destabilizing local confrontations." He says that smaller and smaller groups may obtain these weapons until the world becomes as divided as feudal Europe, with each group threatening the other.

In another article (28), Quester looks at the offensive and defen-

sive potential of guerrilla tactics. Since guerrillas do not try to control and hold assets of disputed territory, they have the mobility and anonymity to inflict considerable destruction and pain on vulnerable points of the established government's economy and on the inhabitants. Thus, U.S. analysts of Chinese strategies often assume that guerrilla activity is *offensive;* for example, the "domino theory" assumes that guerrillas will take sanctuary in a conquered country in order to launch an offensive attack against an adjacent state. A close reading of Mao suggests, however, that the Chinese believe that guerrilla war is a tactic whereby the masses of a country *defend* themselves either from foreign invaders or from internal class rule. On the other hand, Che Guevara and others have emphasized the use of outside guerrilla forces to help indigenous people free their state from tyranny.

The U.S. attitude toward guerrilla activity has evolved from a predominantly "anti-guerrilla" stance to sometime encouragement of such tactics. In 1939 the U.S. was disposed to dignify the guerrilla activities of its Allies, such as those in France, and this attitude has persisted. Are guerrilla tactics possible and, if possible, legitimate when the guerrillas lack popular support? The IRA of Northern Ireland is a very destructive guerrilla group which is not supported by the majority. Quester recommends that U. S. policy makers show an awareness of the fact that guerrillas can be quite successful even when the populace is against them.

Why is the world witnessing, and apparently tolerating, such a substantial increase in the hijackings of airplanes, bombings, kidnappings and other terrorist ventures, notably those of the Palestine Liberation Organization (PLO)? Quester suggests in a forthcoming article that a number of objective conditions have made the terrorist's life easier. The technological base of much of our society is much more fragile than ever before, e.g., transportation by airplanes makes large groups of people very vulnerable. Also, society attaches more and more value to the lives of individuals, as indicated by the rise in specialized and costly medical treatments (such as heart transplants) and by the elimination of the death penalty. Society greatly values the life of the hostage, and is even unwilling to kill the terrorist, thereby saving him to be a bargaining point for other terrorists another day. Another factor in rising terrorism, especially for groups like the PLO, is that those organizations have little to lose. If the PLO acquires assets, such as territory it calls its own, it will become as vulnerable as other modern states, and so less likely to initiate terrorism for fear of retaliation. Also, the technology to deter crime, such as letter bomb detection devices, may begin catching up with the rest of our technology. We should think more deeply about the tactics and technology needed to deter terrorists.

Richard Smoke

Smoke has worked on analyzing the history and present course of U.S. military strategy, and the most effective means for determining

the best future direction for U.S. military policies.

In a forthcoming book, *Controlling Escalation,* he analyzes the difficulties of controlling conflicts. Escalation, much less its control, is difficult to study for several reasons, including the fact that "Its complexity subsumes many variables of many different kinds, including subjective and psychological factors that make it hard to examine rigorously." "Escalation" has several meanings. Smoke uses a definition that pictures escalation as a process whereby one party's action "triggers a reaction, which in turn leads to a counter-reaction, and so on, with no clear, necessary or definite end to the cycle." He stresses that this image of escalation is *interactive* in nature, and that the interactions can cause new situations which neither party has foreseen. Although escalation is not "automatic" or inevitable, war by its very nature favors escalation; each party is tempted to "raise the stakes" high enough so that the opponent will avoid further risk. Escalation occurs when one party takes a step that "crosses a saliency," Thomas Schelling's term for an objectively noticeable discontinuity in the situation surrounding a conflict.

Smoke then widens the definition by pointing out two aspects of escalation: the bargaining aspect and the practical or direct aspect. In some escalation moves, the decision makers are bargaining tacitly with their opponents to find ground rules that "would be advantageous, yet constrain the fighting . . ." The practical, direct consequences of escalation include such things as a higher level of violence and greater material losses. Smoke points out that retrospective studies of escalation have sometimes imputed bargaining motives to the decision makers involved, when in fact those decision makers were little concerned with bargaining tactics. In other situations, such as when the British and French advanced their naval squadrons into the Crimean Sea just before the outbreak of the Crimean War, the actors were more interested in the symbolic than the practical effect of their actions. Thus, Smoke suggests that the bargaining aspect of escalation should be treated as a variable which may be present in differing degrees, perhaps virtually absent from the situation under study.

One important aspect of a conceptual analysis that would help determine how to control escalation in specific situations is an assessment of the opponents' expectations. Smoke states that ". . . decisions for and against a change of policy in war . . . are made with reference to a 'universe' . . . of expectations about the cause and outcome of the conflict," and this universe of expectations is "heavily psychological or subjective." He adds that a major difficulty in assessing policymakers' expectations is that they are often partly unconscious, and even when conscious, are often kept secret. Smoke recommends that, especially when dealing with a crisis, policymakers should make a focused effort to understand the expectations of opposing nations' policymakers.

After World War II, the U.S. emerged with world military supremacy. This has now changed for several reasons. One involves the tremendous technological advancement in weapons systems and other

military areas. In an article on national security affairs (32), Smoke emphasizes that since the cost of this technology has also risen sharply, the U.S. is now hard put to maintain military supremacy against all competitors. Smoke says that for this and other reasons, "the entire history of U.S. military technology since World War II has been . . . one of a gradual but steady erosion of what was once an overwhelmingly commanding position."

Not only has technology advanced rapidly in quality and in costs, but also the international system has changed drastically since the close of World War II. Major recent shifts include: the Sino-Soviet split; the end of the classical Cold War; and the rise in influence and activity of many developing countries which not only have desperate needs, but also possess important resources and growing military capacities of their own. While tracing the history of world affairs in the post-war period from the standpoint of national security, Smoke also traces the history of the *study* of national security affairs. He shows how developments in world affairs and in technology influenced the models of national security used by U.S. military and political experts. For example, the threats posed in 1949 by the explosion of the Soviet Union's first atomic bomb and by the Chinese Communist defeat of the Nationalists were instrumental in theorists' development of the idea of "mutual deterrence." Later, the Eisenhower Administration promulgated the idea of "massive retaliation," in part in response to the Korean War. John Foster Dulles suggested publicly that the U.S. would strike quickly and massively at any communist encroachments on the "free world." This policy disturbed and alarmed many political and other analysts. Their analyses of massive retaliation became the first comprehensive "strategic studies" in the contemporary sense. But strategic and other political-military studies have not always fulfilled the promise that analysts originally held out for them.

In fact, the whole role of "theory" in foreign policy is quite problematic. In a chapter of a report to the Commission on the Organization of the Government for the Conduct of Foreign Policy (31), Smoke points out that theories, or models of international reality used as the basis for decision-making in this area, often remain unarticulated and not very well understood. Some persons involved in foreign policy believe that analyzing the assumed model is not as fruitful as leaving foreign policy decisions to the instincts and judgments of the policy makers. Perhaps this belief is partly based on the assumption that the conclusions reached through analysis will be either too rigid or too general for use in the real world. To avoid such impracticality, Smoke suggests theoretical analysis of a limited scope which can yield "policy-applicable theory."

For instance, the first step in the creation of policy is the "diagnosis" of a situation. To do this, policy makers make inferences about the current motives and goals of the leaders of the nations involved, and about how this situation fits into the long-term pattern of events. Policy makers, both individually and as institutional groups, tend to hold a single "reigning" image of each major nation. There are several

ways to encourage the reexamination of reigning images and the development of alternative views. One is the use of "analytical forecasting." Hypothetical situations (or "scenarios") which at first glance seem unlikely to occur can be examined by postulating the most reasonable (or least unreasonable) chain of events that could lead to unexpected outcomes. Such analysis can sometimes identify a sequence which might not be improbable at all. There is reason to think that the Cuban "Missile Crisis," for example, might not have caught the U.S. by such surprise if this type of analysis had been done.

Lawrence Weiler

Before he joined the faculty of Stanford University Weiler was closely involved in policy-making as it concerned arms control. Last year he brought this practical experience to bear on analyses of U.S. strategic policy and on teaching students about the problems of controlling arms.

In an article that appeared in December 1974 (36), Weiler detailed the contemporary status of SALT. He notes that the central result of SALT I was the ABM Treaty, which "assures the continued effectiveness of surviving missile forces on both sides, an essential element of deterrence and strategic stability." This achievement was reinforced in SALT II with the Protocol reducing permitted ABM sites from two to one. Although the agreements to limit defensive arms have been quite successful, the U.S. and Soviet Union have failed to stabilize offensive weaponry, particularly in the area of arms which have multiple warheads (MIRV's). Before SALT I there was a struggle within the bureaucracy in Washington, and perhaps in Moscow, to get a serious MIRV negotiation started, but it did not succeed. The U.S. presented a proposal to the Soviet Union which was known to be unacceptable to the Soviet Union and the Russians predictably refused to accept it. After it became evident that the U.S. was not interested in a MIRV ban, the Soviet Union lost interest in effective offensive arms limitations.

The first year and a half of SALT II did not produce any progress on the limitation of offensive weaponry, and eventually the Soviets initiated MIRV programs on a large scale. These alarmed U.S. officials, largely because of the perceived instabilities resulting from a Soviet throw weight advantage in MIRVed missiles. The Vladivostok accords of 1974 are an attempt to temper these instabilities, at least in the future. These accords "represent a decision to let the current strategic generations go and attempt to put a cap on following generations." The agreement involves ceilings on the number of missiles with multiple warheads that will be allowed for each country. The difficulty with the agreement is that it may have the effect of "legislating" strategic programs desired by the military on both sides (the military may consider the ceiling a minimum). In any case, Weiler recommends that the U.S. analyze why the arms control agreement process succeeded in the area of defensive strategic weapons, but met with limited failure on offensive arms. He notes that the Congress and the

public have been frequently excluded from effective participation in the decision-making process.

Weiler's work was extensive last year in developing methods for teaching students about arms control, a relatively new academic subject. In addition to participation in the writing of a Stanford-sponsored textbook on arms control, he and other members of the Stanford Arms Control and Disarmament Program developed a course in which students simulated SALT II. The class is divided into the U. S. and the Soviet side, and the students are then told to follow procedures much like those in the actual SALT negotiations. Extensive research is done, policy papers presented, instruction is given to delegates, etc. After Weiler reported (35) the outcome of the first Stanford "SALT," he received requests from forty institutions for more detailed information about the class and about the final student "agreements."

Joe Wray

Last year, Wray continued to investigate the variables affecting the health of infants and children in various cultures. In a forthcoming paper, he analyzes the survival and growth of infants in traditional, transitional and modern societies. Traditional societies generally exist on a subsistence economy, the families are multigenerational and extended, and women in such societies usually undergo socialization processes which provide excellent preparation for motherhood. In modern societies, the economy is a cash exchange system, families are nuclear and often isolated, and the socialization processes "increasingly have little to do with motherhood." The transitional societies, or subcultures, are those which are typically moving from a traditional economy to a modern economy, and have "gotten stuck halfway there in some urban slum." The economy is on a cash basis, the families are often nuclear and isolated, and traditional socialization processes are often disrupted, frequently because the mothers must work full time. In Wray's studies he found that infant mortality was lowest in modern societies, highest in transitional societies, and moderate in traditional societies. One of the most important reasons for their moderate mortality level is that in traditional societies, the mothers almost invariably breast feed their children. This provides protection against infection, and because lactation tends to suppress ovulation, it helps in the spacing of children. Although women in modern societies often do not breast feed, their environment is so benign that it compensates for the lack of mother's milk. Women in transitional societies often cannot breast feed because of the need to work and yet their environment is even poorer than that of a traditional society. Consequently, they pay a high price in infant mortality.

Wray emphasizes that it is essential to scrutinize the problems of and possible solutions to infant health in transitional societies (40). He points to China as a developing country which has successfully avoided the high infant mortality rate of most transitional societies (41).

VIII. PUBLICATIONS

Some scholars bring to the Center completed research and use their time here to write the results of it. Others begin to work in different areas or find new directions for their research. Consequently, the lead times between fellowships and their tangible results vary considerably. The following is a list of those books and articles which were published last year. Material described in earlier reports is marked with an asterisk.

1. *ALLISON, GRAHAM. "Implementation Analysis: 'The Missing Chapter' in Conventional Analysis. A Teaching Exercise," in *Benefit-Cost and Policy Analysis Annual 1974*, R. Zeckhauser, A. Harberger, R. Haveman, L. Lynn, W. Niskanen, and A. Williams, Eds., Chicago, Illinois: Aldine-Atherton, 1975, 369-391.
2. _____ and F. A. MORRIS. "Armaments and Arms Control: Exploring the Determinants of Military Weapons." *Daedalus*, Vol. 104, No. 3, Summer 1975, 99-129.
3. *ARMER, PAUL. "Computer Technology and Surveillance." *Computers and People*, Vol. 24, No. 9, September 1975, 8-11.
4. *_____. "Computer Technology and Surveillance"—Testimony Before the U.S. Senate-Subcommittee on Constitutional Rights of the Judiciary Committee, and Subcommittee on Science and Technology of the Senate Committee on Commerce, June 1975.
5. *_____. "The Individual: His Privacy, Self-Image, and Obsolescence." *Computers and People*, Vol. 24, No. 6, June 1975, 18-33.
6. BREWER, GARRY D. "An Analyst's View of the Uses and Abuses of Modeling for Decisionmaking." Rand Corporation Paper #P-5395, January 1975.
7. _____. "Serving Handicapped Children: The Road Ahead." *Child Welfare*, Vol. 54, No. 4, April 1975, 257-267.
8. _____ and J. L. FOSTER. "And the Clocks Were Striking Thirteen: The Termination of War." Rand Corporation Paper #P-5995, February 1976.
9. _____ and J. S. KAKALIK. *Mental Health and Mental Retardation in Nevada*. Santa Monica, California: The Rand Corporation, R-1800-FLF, 1976.
10. CROZIER, MICHEL. "The Governability of Democracies. The European Case," in *The Crisis of Democracy. Report on the Governability of Democracies to the Trilateral Commission*, M. Crozier, S. P. Huntington and J. Watanuki, Eds., New York, New York: New York University Press, 1975.
11. DAVIS, OTTO A., M. A. H. DEMPSTER, AARON WILDAVSKY. "Towards a Predictive Theory of Government Expenditure: U.S. Domestic Appropriations," *British Journal of Political Science*, Vol. 4, Part 4, October 1974, 419-452.
12. FINE, JACOB, WILLIAM PARSON and OSLER PETERSON. "Urgent Problems in Health Care: Availability, Quality and Cost." *Bulletin* of the American Academy of Arts and Sciences, Vol. 29, No. 1, October 1975, 17-39.
13. FRIEDSON, ELIOT. *Doctoring Together. A Study of Professional Social Control*. New York, New York: Elsevier Scientific Publishing Company, 1975.

14. HERNES, GUDMUND. *Makt og Avmakt*. Oslo, Norway: Universitetsforlaget, 1975. (Note: To date this has been published in Norwegian only.)

15. _____. "Per-Capita-Ideologi og Koplingsgevinster." *Samtiden*, Vol. 8, 1975, 490-497.

16. _____ and O. BERREFJORD. "Markedsforvitring og Statsbygging Synspunkter på Storforetaksundersøkelsen." *Sosialokønomen*, Vol. 7, September 1975, 3-16.

17. LEDERBERG, JOSHUA. "DNA Splicing: Will Fear Rob Us of Its Benefits?" *Prism*, Vol. 3, No. 10, November 1975, 33-37.

18. MANSFIELD, EDWIN. "International Technology Transfer: Forms, Resource Requirements, and Policies." *American Economic Review*, Vol. LXV, No. 2, May 1975, 372-388.

19. _____. "Organizational and Strategic Factors Associated with Probabilities of Success in Industrial R&D." *Journal of Business*, Vol. 48, No. 2, April 1975, 170-199.

20. _____ and JOHN RAPOPORT. "The Costs of Industrial Product Innovations." *Management Science*, Vol. 21, No. 12, August 1975, 1380-1386.

21. MECHANIC, DAVID. "Sociocultural and Social-psychological Factors Affecting Personal Responses to Psychological Disorder." *Journal of Health and Social Behavior*, Vol. 16, No. 4, December 1975, 13-29.

22. _____. "Some Problems in the Measurement of Stress and Social Readjustment." *Journal of Human Stress*, Vol. 1, No. 3, September 1975, 43-48.

23. _____. "The Organization of Medical Practice and Practice Orientations Among Physicians in Prepaid and Nonprepaid Primary Care Settings." *Medical Care*, Vol. 13, No. 3, March 1975, 189-204.

24. _____ and J. R. GREENLEY. "The Prevalence of Psychological Distress and Help-Seeking in a College Student Population." *Social Psychiatry*, Vol. 11, 1976, 1-14.

25. _____ and WILLIAM PARSON. "Shortcuts Are Not Necessarily Bad." *Journal of Medical Education*, Vol. 50, June 1975, 638-639.

26. PETERSON, OSLER, and other members of the Subcommittee on Surgical Manpower of the American Surgical Association and the American College of Surgeons. "Surgical Manpower" in *Surgery in the United States*, Robert Potter, Editorial Consultant, Baltimore, Maryland: Lewis Advertising Company, 1975.

27. *PUSIĆ, EUGEN. "Intentions and Realities: Local Government in Yugoslavia." *Public Administration*, Vol. 53, Summer 1975, 133-152.

28. QUESTER, GEORGE. "The Guerrilla Problem in Retrospect." *Military Affairs*, Vol. 39, No. 4, December 1975, 192-197.

29. _____. "The International System" in *The Handbook of Political Science*, Vol. 7, N. Polsby and F. Greenstein, Eds., Reading, Massachusetts: Addison-Wesley, 1975.

30. _____. *Offense and Defense in the International System*. New York, New York: Wiley and Son, 1976.

31. SMOKE, RICHARD. "Policy-Applicable Theory" in *Towards More Soundly Based Foreign Policy: Making Better Use of Information* by Alexander George. This is a Report to the Commission on the Organization of the Government for the Conduct of Foreign Policy, (Murphy Commission). Washington, D.C.: U.S. Government Printing Office, 1976, Appendices, Vol. 2.

32. _____. "National Security Affairs" in *The Handbook of Political Science*, Vol. 7, N. Polsby and F. Greenstein, Eds., Reading, Massachusetts: Addison-Wesley, 1975.

33. STAVRIANOS, LEFTON. *The Promise of the Coming Dark Age*. San Francisco, California: W. H. Freeman, 1976.

34. *TENDLER, JUDITH. *Inside Foreign Aid*. Baltimore, Maryland: Johns Hopkins University Press, 1975.

35. WEILER, LAWRENCE. "Stanford Solves SALT II." *Arms Control Today*, Vol. 5, No. 1, January 1975, 4-5.

36. _____. "The Status of SALT: A Perspective." *Arms Control Today*, Vol. 4, No. 12, December 1974, 1-4.

37. *WEIZENBAUM, JOSEPH. *Computer Power and Human Reason*. San Francisco, California: W. H Freeman, 1976.

38. WILDAVSKY, AARON. "The Past and Future Presidency." *The Public Interest*, No. 41, Fall 1975, 56-76.

39. FRIEDLAND, EDWARD, P. SEABURY and AARON WILDAVSKY. *The Great Détente Disaster. Oil and the Decline of American Foreign Policy*. New York, New York: Basic Books, 1975.

40. WRAY, JOSEPH. "Child Care in the People's Republic of China." *Pediatrics*, Vol. 55, No. 4, April 1975, 539-562.

41. _____. "Health and Nutritional Factors" in *Childhood in China*, W. Kessen, Ed., Cambridge, Massachusetts: Yale University Press, 1975.

IX. PRESENTATIONS

Paul Armer

"Computer Technology and Surveillance," Testimony before the U.S. Senate—Subcommittee on Constitutional Rights of the Judiciary Committee and Subcommittee on Science and Technology of the Senate Committee on Commerce.

"Computers and Privacy," at the Columbia University Law School.

"Electronic Funds Transfer Systems," at the National Conference of the Association for Computing and Machinery, San Diego, California.

Garry Brewer

"An Analyst's View of the Uses and Abuses of Modeling for Decisionmaking," at the American Association for the Advancement of Science Meeting, New York, New York.

"And the Clocks Were Striking Thirteen: The Termination of War," at the Symposium on Man and Society, School of Medicine, Stanford University.

"Increasing the Use of Social Science Research," at the American Sociological Association, San Francisco, California.

Otto Davis

"The Sport of Kings: Turnout in Presidential Preference Primaries," at the 1975 Annual Meeting of the American Political Science Association, San Francisco, California.

Michael Dempster

"Abstract Optimization and Its Applications," Nine lectures delivered in the School of Mathematical Sciences, University of Melbourne, Australia.

"Applications of Abstract Mathematical Programming to Stochastic Optimization Problems," at the National Science Foundation's International Symposium on Stochastic Systems, University of Kentucky.

"An Approximate Method for the Solution of the Distribution Problem of Stochastic Linear Programming," at the Operations Research Colloquium, Stanford University.

"A Crude Model of the Modern Economy," at the Cutting Edge Seminar, Center for Advanced Study in the Behavioral Sciences, Stanford, California.

"Interagency Bargaining Models," at the Budgeting Seminar, Center for Advanced Study in the Behavioral Sciences, Stanford, California.

"A Necessary and Sufficient Condition for Optimal Control," at the International Congress of Mathematicians, University of British Columbia, Vancouver, Canada.

"On the Structure of $L^* \infty$" at the Pure Mathematics Department Colloquium, University of Melbourne, Australia.

"A Predictive Theory of the Federal Budget Process," at Stanford University: Public Policy Seminar, Graduate School of Business; Social Systems Seminar, Engineering-Economic Systems Department; Public Economics Seminar, Economics Department.

"The State of the Art in Stochastic Programming," at The Naval Post-Graduate School, Monterey, California C.S.I.R.O./Australian National University Statistics Seminar, Canberra, Australia; Applied Mathematics Department, University of New South Wales, Sydney, Australia.

Jacob Fine

"The Mechanism of Defense Against Major Injury," at the Stanford Medical School, Stanford University.

"Quality of Care," at the American Academy of Arts and Sciences Stated Meeting, Kaiser Center, Oakland, California.

Robert Haggerty

"Building Healthier Life Styles," at the California Association of Child Health, San Francisco, California.

"The Conceptual and Empirical Bases of Family Health Care," at the Meeting of the National Council of Social Work in San Francisco, California.

"Effectiveness of Child Health Services," at the University of Washington.

"Effectiveness of New Community Child Health Services," at the Bay Area Health Care Club, San Francisco, California.

"Evaluation of Child Health Services," at the UCLA School of Public Health.

"Evaluation of Community Child Health Services," at the Oakland Children's Hospital, Oakland, California.

"Evaluation and Planning of Child Health Services," at the International Pediatric Congress, Buenos Aires, Argentina.

"Family Crises and Child Health," at the Oakland Children's Hospital, Oakland, California.

"Family Crises in Child Health Services," at the Mental Health Research Institute, Palo Alto, California.

"Promoting the Health of Children," at Washington University.

"Teaching Children How to Lead Healthier Lives," at the California Pediatric Society, San Francisco, California.

Gudmund Hernes

"Collective Decision Models," at a conference on energy policy, University of Amherst.

"Equality of Educational Opportunity," at the Council for Levels of Living Study Meeting, Oslo, Norway.

"Equality of Opportunity Under Educational Expansion," at Michigan State University.

"Notes on Structural Change," at meetings of the International Sociological Association, Toronto, Canada.

"The Open Input-Output Model, Collective Decisions and Policy Analysis," at MSSB Conference, Chicago, Illinois.

"Organized Complexity and Structural Change," at MSSB Conference, Washington University.

"The Paradox of Vote Trading and the Market for Externalities," at the Annual Meeting of the Public Choice Society, Chicago, Illinois.

"Power and Collective Decisions: Extensions and Applications," at the Conference on Power in Organizations, Stanford, California.

"State-Building and the Diminishment of Markets," at a meeting of the Council for Norwegian Power Study Group, Oslo, Norway.

David Mechanic

"Administration of Mental Health Services and Organizational Behavior," for Directors of the New York City Psychiatric Hospitals at Columbia University.

"Distress and Coping among College Students," at Student Health Services Department, Stanford University.

"The Epidemiology of Help-Seeking," at Department of Psychiatry, Stanford University.

"Factors Affecting Physician Behavior and Responses to Patients," at the Institute for Personality Assessment Research, University of California, Berkeley.

"Mental Health Ideologies and the Organization of Mental Health Services," at a conference organized by Peninsula Hospital, Asilomar, California.

"Models of Patient and Physician Behavior," at University of California, Berkeley.

"National Health Insurance," at the 50th Anniversary Program of the University of Wisconsin Hospitals, University of Wisconsin.

"Seeking Care for Psychological Problems," at the School of Allied Health Sciences, Johns Hopkins University.

"Seeking Care for Psychological Problems: Models for Investigation," at Department of Sociology, U.C., Berkeley; Yale University; and UCLA.

"Social Selection and the Use of Psychiatric Services," at the Department of Sociology, Stanford University.

"Studies of Patient and Physician Behavior," at the Health Services Administration Program, Stanford, and at the Department of Social Relations, Johns Hopkins University.

Uwe Nerlich

"Beyond the Cold War," at the University of Chicago.

"Choices of Soviet Westpolitik," at the University of California, Berkeley.

"Military Threats and Political Instabilities in Europe," at the Conference on Technology, Politics and the Defense of Europe, Munich, Germany.

"Problems of European Security," at Stanford University.

"Soviet-American Bilateralism as a Constraint on Soviet Behavior in Europe," at a Conference on the Role of Soviet Military Force in Munich, Germany.

"Strategic Alternatives," Panel at a Pan-Heuristics Conference, Los Angeles, California.

William Parson

"Availability of Care," at the American Academy of Arts and Sciences Stated Meeting; Kaiser Center, Oakland, California.

Osler Peterson

"Is Medical Care Worth the Price?" at the American Academy of Arts and Sciences Stated Meeting; Kaiser Center, Oakland, California.

"Measuring Student Skills," at the Medical School of the University of California, San Francisco.

Richard Smoke

"Initial Development of Hypotheses Concerning an Experiential/Stylistic Approach to Personality," at the Psychology Department, University of California, Berkeley.

Lawrence Weiler

"Education in the Field of Arms Control," at the Symposium on Courses in Physics and Society at the 1975 Annual Meeting of the American Physical Society, Anaheim, California.

"Strategic Policy and Strategic Arms Control," at 1975 Stanford Alumni Conference, Stanford University; California State College at Stanislaus; and the Stanford Arms Control and Disarmament Program's Faculty Seminar, Stanford University.

Joe Wray

"Health Maintaining Behavior of Mothers in Traditional, Transitional and Modern Societies," at a Session on Health Maintaining Behaviors, American Association for the Advancement of Science, New York, New York.